

Method for Production of a Flexible Shaped Strip

The invention relates to a method for producing a flexible shaped strip of plastic material for use in a fixing system which fixes a cushion cover to a cushion component, the cushion component consisting of a foamable material, being provided with a longitudinal passage therein for the engagement of the shaped strip, which, in order to heighten the tear resistance, to prohibit tearing of the strip out of the cushion component, is provided at least partially with a slip preventer.

With a method of this type as in DE 198 08 995 C1, a longitudinal passage adapted to the shape of the shaped strip is arranged within the cushion component, which has recesses in its longitudinal layout which serve for the engagement of interlocking elements on the shaped strip. With the known method, the foam material is arranged in such a manner that the cushion component surrounds the shaped strip contiguously, so that beneficial interlocking of the shaped strip in the cushion component is attained. The interlocking forces of the shaped strip in the cushion component are generated essentially through the adhering forces between the surface of the

shaped strip and the associated foam material. Furthermore, to increase the tear resistance of the shaped strip in the foam, with the known solution it has been suggested to configure the strip of anti-slip components; this leads however to relatively weak shaped strips and the desired increase of tear resistance forces is not attained at all. Another possibility resides basically in a method for increasing the tear resistance in that a hard foam material is selected for the cushion component. The manufacture of hard foam can generally be attained very simply by variation of the polyhydric alcohol content and the hardener content as well as their percentage composition in the cushion component material. Hard foam however leads to reduction of the degree of seat comfort, which is undesirable.

Starting from this state of the art the object of the invention is to make available a method for the production of a shaped strip of which the tear resistance can be notably increased in comparison with the known solutions for shaped strips in cushion components, without leading to reduction of seat comfort. Such an object is attained by a method having the features found in Claim 1.

Since according to the disclosure part of Claim 1 a soft plastic material is used as slip preventer for the shaped strip, serving as the plastic forming the shaped strip, and this slip preventer is applied at least partially on the exterior periphery of the shaped strip, a modification of the surface property is thus attained for the shaped strip, whereby measurements have shown that the tear resistance forces with this arrangement are notably higher than with comparable methods without anti-slip coating. Therefore, because of the slip prevention provided for the shaped strip, hard plastic materials can be used for the shaped strip, such as high density polyethylene.

Particularly high tear resistance forces can be obtained insofar as, preferably with the method according to the invention for slip prevention, a material is used such as a plastic material of which the Shore hardness is below 150, preferably 30 to 60, and particularly is 60.

With one particularly preferred embodiment of the method of the invention, the plastic material having anti-slip components is applied by means of extrusion, particularly by means of a coextrusion method, applying the material to the plastic shaped strip. Here the use of EPDM-rubber has proven particularly favorable.

With another preferred embodiment of the method of the invention, the plastic material having anti-slip components is applied to the shaped strip by means of a hot dipping method. Weakly adhering adhesives on a base of synthetic rubber are particularly to be considered in this case for use as the coating.

In the case of another preferred embodiment of the method of the invention, the anti-slip components plastic material is applied by means of a spray-coating method, being sprayed onto the shaped strip. Using such a method whereby the layers are applied by spraying very thin layers one after the other onto the shaped strip, and as coating material, a one-component adhesive based on nitroxyl or nitrous rubber base from an organic solution is preferably used.

In the case of one more preferred embodiment of the method of the invention, the plastic material having anti-slip components is applied by means of a traditional coating or doctoring method, whereby the applied coating is hardened by means of ultraviolet light and/or by an electron

radiation source. The viscosity of the anti-slip components material can be adjusted by addition of a reactive diluting medium.

Hereinafter the method of the invention will be described in greater detail.

The single drawing shows a representation in principle and not in scale of a section of a seat component.

The fixing system shown in the drawing serves for a vehicle passenger seat, whereby aircraft passenger seats can also be considered as vehicle passenger seats. The vehicle seat has at least one cushion component 10, arranged for example in the area of either the seat surface or the backrest. Cushion component 10 consists of a foamed material, particularly of polyurethane foam. Such foam is configured to be finely porous. A cushion covering 12 serves for the covering of cushion component 10 on its outside facing outward into the environment, which is shown only diagrammatically in the drawing, the covering for example consisting of a fabric or leather material. Cushion covering 12 is pulled tight and anchored to cushion component 10 with formation of an ornamental trim or anchoring seam 14 and, attached by means of a sewn-on seat fastening clip 16 of fabric, fleece, metal gauze,

plastic material or the like, the cushion component is provided with a shaped strip 18 serving as anchoring means.

A longitudinal passage 20 is built into the foam material of cushion component 10 to receive shaped strip 18, which passage 20 engages contiguously with shaped strip 18. Shaped strip 18 is held flexibly at least in longitudinal direction, and is formed of plastic material, for example of a soft PVC of Type 740012 of Firma Decelith or of a hard High Density Polyethylene (HDPE) for example of the Type 65428 from Firma Schulmann. Shaped strip 18 has a receiving slot 22, into which is inserted the sewn-on seat fastening clip 16 like a stem or a crosspiece. Cushion covering 12 is tightly articulated with the other end of sewn-on seat fastening clip 16 through a sewn seam or by some adhesive method. Except for that securing point, sewn-on seat fastening clip 16 is configured to be longitudinally flexible, particularly in the direction of lowering the body onto the seat.

An enlargement 24 is provided for receiving ornamental trim seam 14 with sewn-on seat fastening clip 16, the enlargement opening outward into the environment and inward into a stem- or crosspiece-like shaped cutout 26,

arranged to receive the passage of sewn-on seat fastening clip 16 and which with its other end in turn is opened into longitudinal passage 20. Since the foam material is compressible within a predeterminable range, shaped strip 18 can be inserted manually in steps and also can be removed repeatedly from the associated longitudinal passage 20, insofar as material exchange, repair or the like is required.

The possible depth 28 at which the construction is built in, which is indicated in the drawing with a double arrow, with modern vehicle seats can no longer be varied optionally, since cushion components 10 are configured to be quite thin, with the result that a very thin cross section must also be selected for the shaped strip 18, in order during use to avoid the discomfort of sitting down on and feeling the shaped strip which in and of itself is hard. Since the cross sections for shaped strip 18 must then be of small dimensions and can no longer be selected to be of any optional desirable dimensions, therefore it is necessary, despite the narrowness of shaped strip 18, to anchor said strip securely in the foam material, in order to prevent an undesirable tearing out, which would lead to destruction of cushion covering 12. To increase the tear resistance, interlocking configurations 30 can also be provided on the exterior periphery of shaped strip 18, as further slip

prevention elements which engage in the foam material, whereby preferably in this case the foam material is accessible through corresponding channel-like cutouts. Individual features of such a fastening system can be obtained from DE 198 08 995 C1.

In order to increase the tear resistance for such a solid shaped strip 18, which also can be configured profiled as a hollow chamber, which is not shown, coatings of anti-slip components which are applied to shaped strip 18 serve to provide this function. The layer thickness of such an anti-slip components material is quite thin, so that for simplified representation it has simply been deleted from the drawing. Particularly plastic materials have been proven as favorable for use as anti-slip components, forming materials of which the Shore hardness is lower than 150, preferably between 30 and 60, and particularly preferably is 60. Improved adherence of the foam material to shaped strip 18 having the coating is obtained when soft plastic material is used for the coating. Preferably then the extremely soft plastic is applied by coextrusion in the area of the undercut 32, where the soft plastic engages and from below supports the wing-like widened areas on the top of longitudinal passage 20. As another plastic type, for example EPDM rubber of Firma Macromas can be used. By EPDM rubber is to be understood the



terpolymerization of ethylene and greater portions of propylene as well as a few percentage points of a third monomer rubber with diene structure, in which the diene-monomer provides the required double bonds for a subsequent sulfur vulcanization.

Another possibility for the application of anti-slip components coating is obtained by a hot melt coating method, for example using a weakly adhering adhesive on a base of synthetic rubber, which is widely available but particularly under the mark 'Lunatack AS 3916' from the H. B. Fuller Company. The processing occurs then through a spray-nozzle or roll application in an atmosphere of 150 to 175° C. The viscosity at 175° C is approximately 14,000 mPas, whereby the softening point is at about 117° C. The viscosity is then determined in terms of DIN 53018 and the softening point in terms of DIN 52011.

Another method provides a spray coating, whereby very thin layers are generated on shaped strip 18. Preferably in this case a one-component special adhesive material on nitrile-rubber-base from an organic solvent is used, for example Type 1475 of Firma Bostik. The aforementioned special adhesive is an adhesive of the type which can also be used as a two-

component adhesive. The adhesive is formed on nitrile rubber base and preferably ketones or esters serve as solvent medium. The viscosity is 3100 mPas.

With one further coating method, a UV-hardenable composition is used, for example 85% Ebecryl 4835 as reactive oligomer, with 15% Ebecryl 111 added thereto as reactive diluting medium for adjustment of the viscosity of the anti-slip components plastic material. The resulting products can be obtained from Firma UCB.

With the aforementioned application method the shaped strips can provide conventional fixing systems having remarkably higher tear resistance, so that a secure anchoring of shaped strip 18 in the foam material is guaranteed. Despite increased interlocking forces, shaped strip 18 without any further manipulation can be repeatedly detached from the foam material, which would not be possible if shaped strip 18 were securely cemented in the foam material. Dependent upon the selected combinations of materials, the resulting fixing system can also be disposed of in an environmentally compatible manner or can be recycled.

In the case of one further preferred embodiment of the method of the invention, the anti-slip components plastic material is applied by means of a dipping coating method. In this case the coating material being used is preferably a one-component adhesive nitril rubber base out of an organic solution. Optionally during the so-called flash-off periods of time, the profile is fed through an additional dipping trough, which contains flakes or clots, consisting primarily of polyurethane foam or of fibers. Thus a tight connection of the flakes or clots with the profile is generated for the formation of an anti-slip layer.

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